

## Supplementary material

### 1. Supplementary table

**Table S1.** Distribution of the instruments in the upper 601 m at the Stratus mooring 8 March 2014 to 25 April 2015.

Depth (m)	Instrument	Velocity	Parameter
1	SBE37		T, S
4	SBE37		T, S
5	SBE39		T
7	SBE37		T, S
10	NORTEX	yes	
13	RCM11	yes	
16	SBE37		T, S
20	RCM11	yes	
25	SBE39		T
30	SBE37		T, S
32	RCM11	yes	
35	SBE39		T
40	SBE37		T, S
45	SeaGuard	yes	(O <sub>2</sub> failed)
50	SBE39		T
55	SBE39		T
63	SBE37		T,S
70	SBE39		T (until November 2014)
78	SBE39		T (until September 2014)

1	85	SBE37		T, S (both until September 2014)
2	87	SeaGuard	partly	T (until August 2014), (O <sub>2</sub> failed)
3	93	SBE39		T
4	100	SBE39		T
5	107	SeaGuard	yes	T, S, O <sub>2</sub>
6	115	SBE39		T
7	130	SBE37		T,S
8	135	RDI 300 KHZ	yes	
9	145	SeaGuard	yes	T, (O <sub>2</sub> failed)
10	160	SBE37		T, S
11	175	SBE39		T
12	183	SeaGuard	yes	T, S, O <sub>2</sub>
13	190	SBE37		T, S
14	220	SBE37		T, S
15	235	SeaGuard	yes	T, O <sub>2</sub>
16	250	oxygen-logger		O <sub>2</sub>
17	280	SBE39		T (until March 2015)
18	290	SeaGuard	yes	T, O <sub>2</sub>
19	295	SBE37		T, S
20	350	SeaGuard	yes	T, S, O <sub>2</sub>
21	400	SeaGuard	yes	T, O <sub>2</sub>
22	450	SeaGuard	yes	T, O <sub>2</sub>
23	500	oxygen-logger		O <sub>2</sub>
24	550	SBE37		T, S
25	600	SeaGuard	yes	O <sub>2</sub>
26	601	SBE37		T, S

## 2. Supplementary figures

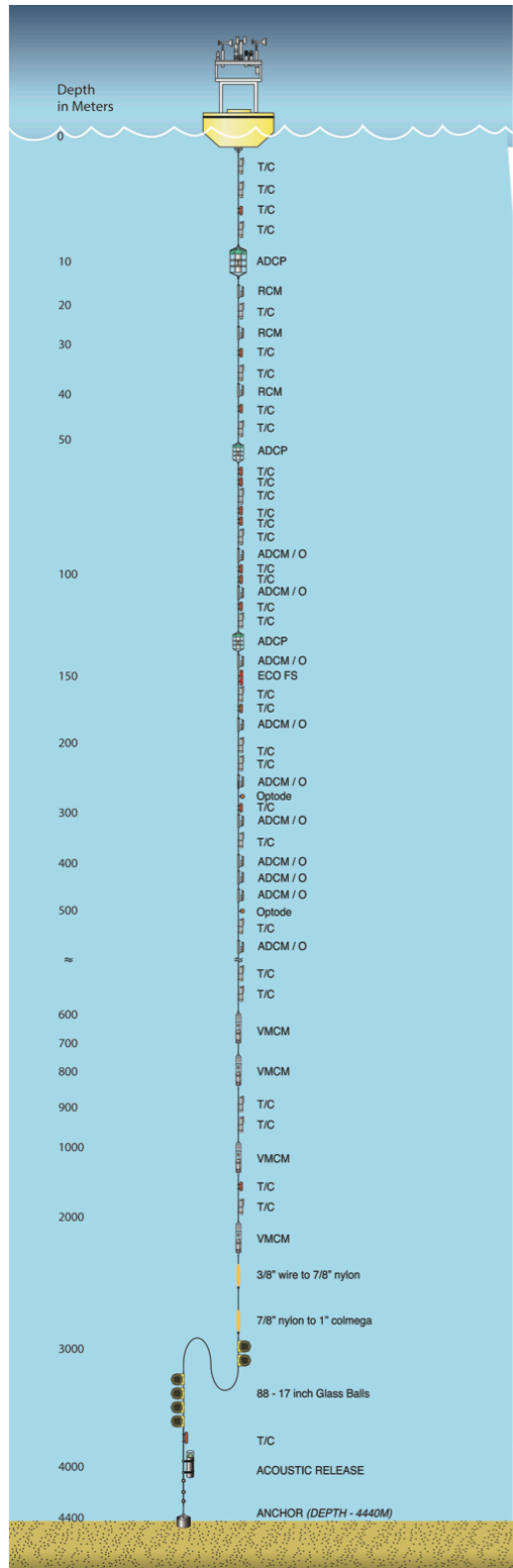
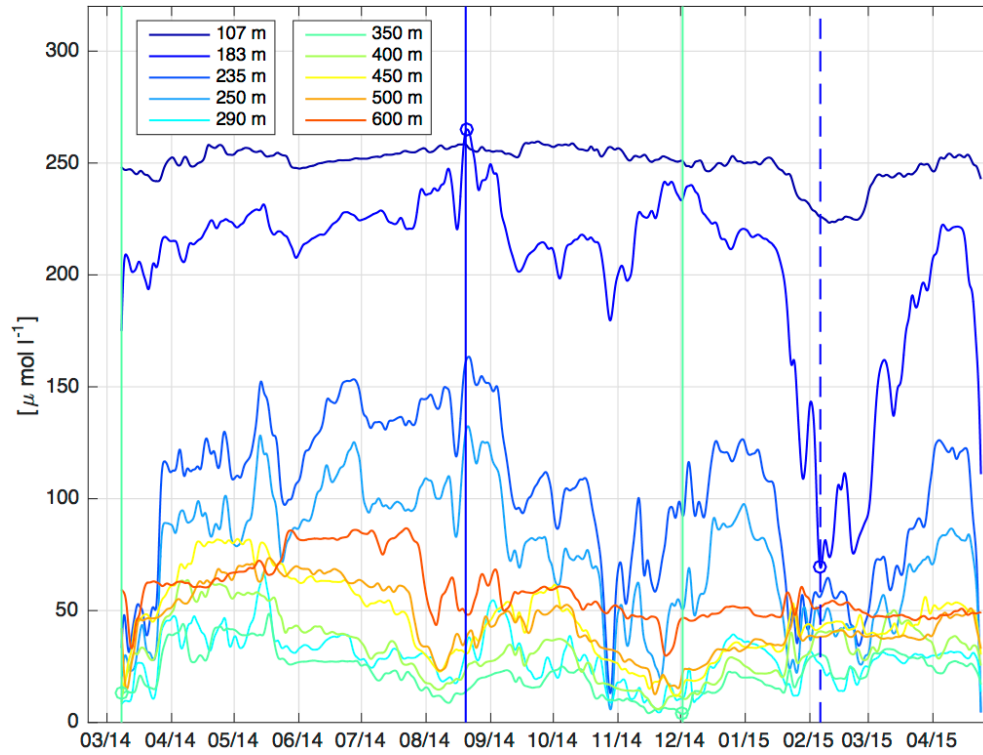


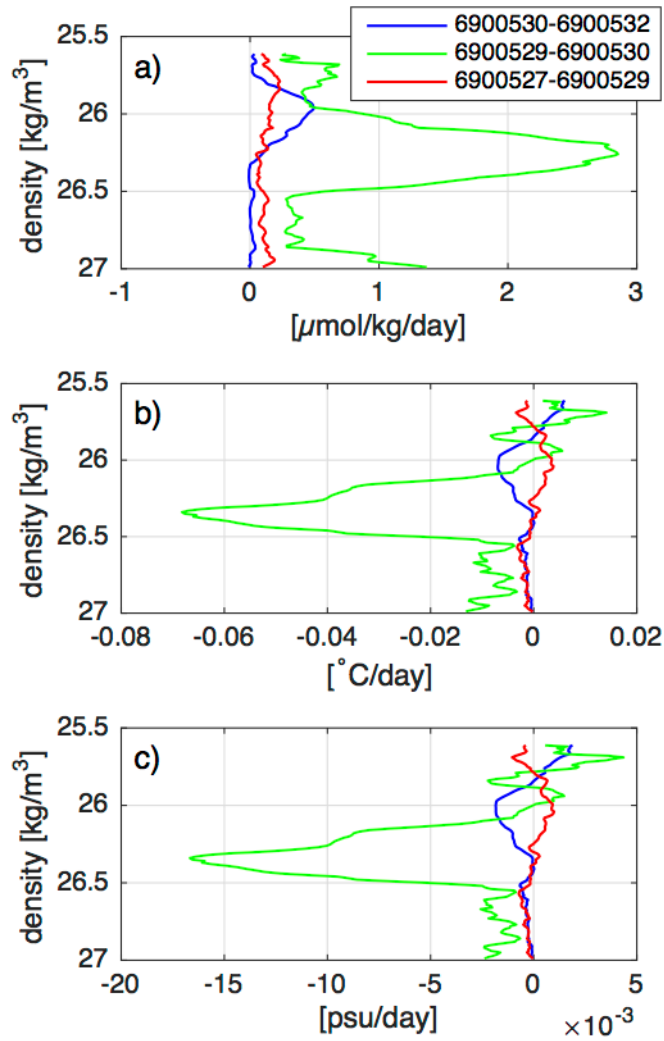
Fig. S1. Distribution of the instruments attached to the Stratus mooring between 8 March 2014 to 25 April 2015.

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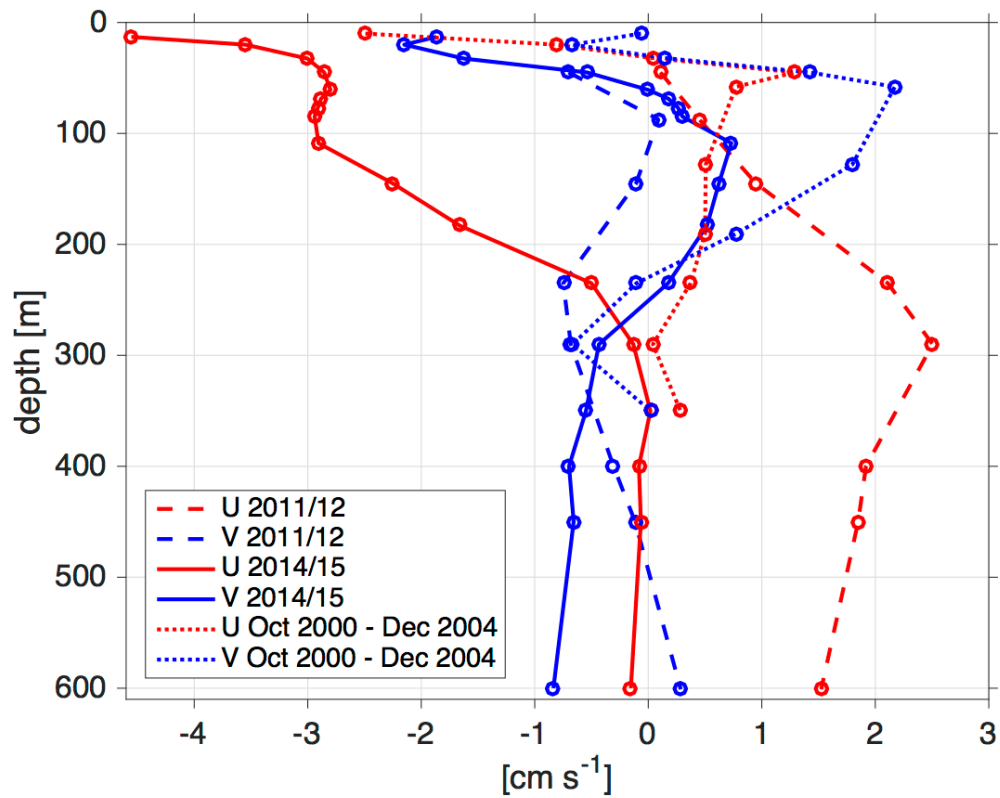


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3 **Figure S2.** Oxygen time series of the Stratus mooring (19°37'S, 84°57'W) for the period 8  
 4 March 2014 to 25 April 2015. The depth of the oxygen instruments are color coded (see  
 5 insets). Solid (dashed) lines show the date of the passages of the anticyclonic (cyclonic)  
 6 eddies.



**Figure S3.** Vertical profiles from data of four floats during their stay within the ACE2 at different stages of its lifetime (6900532: day 235, 6900530: day 379, 6900529: day 398, and 6900527: day 482). Shown are the changes per day of a) oxygen, b) temperature, and c) salinity on density surfaces between float 6900530 and 6900532 (blue), between float 6900529 and 6900530 (green) and between float 6900527 and 6900529 (red).



**Figure S4.** Zonal (red) and meridional (blue) velocity components in  $\text{cm s}^{-1}$  at the Stratus mooring for an annual mean from 10 April 2011 to 9 April 2012 ( $19^{\circ}41'S$ ,  $85^{\circ}34'W$ ; U2011/12, V2011/12; dashed lines), for 10 April 2014 to 9 April 2015 ( $19^{\circ}37'S$ ,  $84^{\circ}57'W$ ; U2014/15, V2014/15; solid lines), and for a multi-year mean from October 2000 to December 2004 (dotted lines) in the Stratus region ( $20^{\circ}S$ ,  $85^{\circ}W$ ; Colbo and Weller, 2007). For instrument distribution see Stramma et al. (2014; Table 1) for the 2011 to 2012 deployment period and Supplement Table S1 for the 2014 to 2015 deployment period.

### 3. Supplementary Movie

#### Movie M1

Sea surface height anomaly (SSHA) in the eastern tropical South Pacific in cm for 1-day intervals between 12 March 2014 and 30 April 2015. The white circle marks the Stratus mooring location, the coloured crosses and lines show the location and trajectories of the floats with 400 m (#6900530, -32) and 1000 m parking depth (#6900527, -29) at the time of the displayed SSHA. The black line shows the eddy track of ACE2.